DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/16/2009 has been entered.

2. Applicant's response to the last Office Action, filed 12/16/2009, has been entered and made of record.

3. Applicant has amended claims 4, 6, 8. Claims 4-13 are currently pending.

4. Applicant's arguments, in the amendment filed 12/16/2009, with respect to the rejections of claims 4-13 under 35 U.S.C. 103(a) have been fully considered and are not persuasive.

5. Applicant argues that Verard does not disclose or suggest either feature (b) or feature (c) of claim 4. Verard discloses that the positions of the PC and AC landmarks are found using a step-by-step procedure performed on a midsagittal image (Verard, Fig. 2(b) caption). Moreover, Verard teaches only that the positions of the PC and AC landmarks are found using a step-by-step procedure (wherein the CC, BS and Co are first identified by scene analysis with anatomical atlases data, and then the PC and AC "are easily localized through the successive positioning of windows B1, B2 and B3") (p. 611, Figs. 2a, 2b). Thus, Verard only teaches steps for localizing the position of PC and AC. Verard is silent, however, about improving the estimated positions of

the localized PC and AC, or about using such localization of the PC and AC to generate one or more radiological images relating to various axial or coronal slices, and then analyzing such slice images to improve the estimate of the position of the AC and PC landmarks. Moreover, Sun (in particular Fig. 3 and the caption cited by the Examiner), the axial and coronal slices of AC and PC are only used for labeling with the help of Talairach's atlas, and are not used to improve the estimated position of the AC or the PC landmark. Indeed, Sun does not disclose or suggest that the axial and coronal slices can be used to improve the estimated positions of the AC or PC landmarks.

In response, Verard teaches a fully automated identification of AC and PC landmarks in the brain using MRI where the method includes the step of taking midsagittal image of the brain and setting an initial threshold of the pixel intensity, and then iteratively modifying threshold levels until successful identification of brain structures such as the AC and PC (page 613 column 2 lines 5-19 and page 614 column 2 lines 6 to page 615 column 1 line 24). Therefore, Verard clearly teaches the step of taking midsagittal image of the brain and setting an initial threshold of the pixel intensity and then iteratively modifying threshold level until successful identification of the AC and PC (see page 615 column 1 lines 1-24). Sun clearly teaches the deficiency of Verard where the automatic method of finding the anterior commissure (AC) and posterior commissure (PC) by estimating the position of midsagittal radiological images and generating axial radiological images and analyzing these to improve the estimate of the position of the landmark (figure 3 and caption) . Therefore feature (b) of claim 4 has been addressed by SUN et al. Additionally the applicant's argument that the combination of all the features recited in claims 4-

13 makes the applicant's invention patentable different is not found persuasive and thus Verard in view of Sun still reads on the applicant's claimed invention.

All remaining arguments are reliant on the aforementioned and addressed arguments and thus are considered to be wholly addressed herein.

Examiner Notes

6. Examiner cites particular columns and line numbers in the references as applied to the claims below for the convenience of the applicant. Although the specified citations are representative of the teachings in the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested that, in preparing responses, the applicant fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the examiner.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 4-10,12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Verard et al (Fully automatic identification of AC and PC landmarks on brain MRI using scene

analysis) and Sun et al (Anatomic labeling of PET brain images with automatic detection of AC and PC)

As to claims 4 and 6, Verard et al teaches method of estimating the position of the AC and/or PC landmarks which includes:

(a) using a midsagittal radiological image to estimate the position of the AC or PC landmarks in the midsagittal plane (page 613, column 2,);

(b) using the estimated position of the AC or PC landmarks to generate a plurality of radiological images relating to different slices „ including a first image of a slice including the estimated position of the AC or PC landmark and second images of neighboring slices (*Localization of the PC and the AC*: Identification of the superior Co allows one to draw [Fig. 2(b)] a small window (approximately 1 1cm) which includes the PC with certainty. Two convolution masks designed for a 1.5 mm voxel size [Fig. 7(a)] are applied independently to the pixels located inside this window. The first one is a directional edge enhancement filter, while the second one acts as a template modeling of the typical grey-level intensity variations close to the PC. Finally, an operation of multiplication of the resulting images is carried out whose maximum value provides a coarse localization of the PC. This coarse position is fine grained by application of a second matched filter inside a smaller region, centered on the previously found the PC position and zoomed by bicubic interpolation, page 614, column 2, lines 6-35); While Verard meets a number of the limitations of the claimed invention, as pointed out more fully above, Verard fails to specifically teach using localization of the PC and AC to generate one or more radiological images relating to various axial or coronal slices, and then analyzing such slice images to improve the estimate of the position of the AC and PC landmarks. Specifically, Sun et

al. automatic method for finding anterior commissure (AC) and posterior commissure (PC) in positron emission tomography (PET) brain image without a reference image is discussed. For labeling and localizing] anatomical structures, a PET image aligned in parallel to the detected AC-PC line is normalized spatially into the corresponding trans axial Talairach brain. Moreover, Sun et al teaches estimating the AC and PC positions on misdagittal radiological images and generating axial radiological images and analyzing these to improve the estimate of the position of the landmarks (figure 3 and caption) it would have been obvious to one of ordinary skill in the art to estimate the positions on misdagittal radiological images in order to make the clinical evaluation images easier, fast and accurate .Therefore, the claimed invention would have been obvious to one of ordinary skill in the art at the time of the invention by applicant.

As to claim 5, Verard et al teaches the method according to claim 4 in which the images are axial images, and step (c) includes deriving a mean ventricular line (MVL), and determining the position of the AC or PC landmarks by scanning intensity values along the MVL (The mean of differences between automatic calculation and manual pointing was close to zero and the standard deviation is established at about 0.35 for both axial and coronal angulations, page 615, column 1 line 24, column 2 lines 1-45)

As to claim 7, Verard et al teaches the method according to claim 4 in which the images are coronal images, and step (c) includes deriving a symmetry line within a first coronal image including estimates of the position of the AC or PC landmarks, and
determining the position of the landmark by scanning intensity values along the
symmetry line (to provide a better intensity contrast, especially in the AC and PC vicinities, we decided to operate on a pseudo midsagittal image, obtained by assigning

to each pixel the lower value in grey-level intensity from the midsagittal and its two adjacent planes, page 613, column 2)

As to claim 8, Verard et al teaches the method according to claim 7 in which there are a plurality of images relating to different coronal slices including second images of coronal slices neighboring the first coronal slice, the method further including the step of determining dimensions of the AC or PC landmarks using the second images (The parameters of the ellipse (center coordinates, axes dimensions and , angle) can be easily calculated with a least mean square algorithm with 16 points of a transaxial brain slice contour on a binary image by employing a threshold, which is not critical since it may range between three and 20 times the background grey level, page 612, column 1)

As to claim 9 and 10, Verard method according to claim 4 in which the landmark is the AC and the landmark is the PC(To localize the AC and the PC, we use a step-by-step scene analysis which allows one to gradually converge, first to PC then to AC, as illustrated in Fig. 2(b), page 611, column 1)

The limitation of claims 12-13 has been addressed above.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Verard et al in view of Sun et al (Anatomic labeling of PET brain images with automatic detection of AC and PC) and further in view of Nowinski et al (WO 02/43003)

While Verard and Sun meets a number of the limitations of the claimed invention, as pointed out more fully above, Neither Verard nor Sun fails to specifically teach generating a first estimate of the position of the landmark as a point on the identified structure wherein the structure is the formix and the landmark is the anterior commissure (AC)

Specifically, Nowinski et al. teaches a system for analyzing a brain image compares the image with a brain atlas, labels the image accordingly, and annotating the regions of interest and/or other structures. This atlas-enhanced data is written to a file (or more than one file) in the Dicom format or any web-enabled format such as SGML or XML format. The image used may be produced by any medical imaging modality. A fast algorithm is proposed for a landmark-based piecewise linear mapping of one volumetric image into another volumetric image. Furthermore, a new set of brain landmarks are proposed, and algorithms for the automatic identification of these landmarks are formulated for three orientations, axial, coronal, and sagittal. Nowinski clearly teaches the generating a first estimate of the position of the landmark as point on the identified structure wherein the structure is the fornix and the landmark is the anterior commissure (figures 4-7A, 7C, and 12) it would have been obvious to one of ordinary skill in the art to identify the structure as the formix and the AC in Verard et al in order to enhance the accuracy of identification by using a robust and efficient algorithm. Therefore, the claimed invention would have been obvious to one of ordinary skill in the art at the time of the invention by applicant.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NANCY BITAR whose telephone number is (571)270-1041. The examiner can normally be reached on Mon-Fri (7:30a.m. to 5:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on 571-272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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